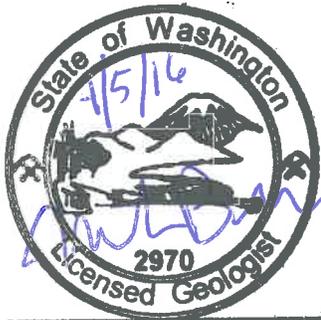




ROBINSON
NOBLE

TACOMA HOUSING AUTHORITY
BAY TERRACE II DEVELOPMENT
25TH & COURT G
TACOMA, WASHINGTON
INDEPENDENT REMEDIAL ACTION REPORT
APRIL 5, 2016

by



MICHAEL PATRICK BRADY

Michael P. Brady, LG
Senior Project Geologist

A handwritten signature in blue ink, appearing to read "John F. Hildenbrand", written over a horizontal line.

John F. Hildenbrand
Principal Environmental Scientist
Environmental Services Manager

Tacoma Housing Authority
Bay Terrace Phase II Development
25th & Court G, Tacoma, WA
Independent Remedial Action Report
April 5, 2016

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Tacoma Housing Authority
Bay Terrace Phase II Development
25th & Court G, Tacoma, WA
Independent Remedial Action Report
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1.0 Introduction

1.1 Purpose and Objectives

The remedial actions at the Bay Terrace Phase II Development, as outlined in this report, were performed as independent remedial actions to receive a determination of “no-further-action” (NFA) through the Washington Department of Ecology’s Voluntary Cleanup Program (VCP) or to determine what, if any, additional remedial actions are needed for the property. The objective of this report is to provide Ecology with the information required to make an NFA determination or to outline any additional activities needed. All laboratory results for this project are compared to the Model Toxics Control Act (MTCA) Method A unrestrictive land use cleanup levels for soil and groundwater.

1.2 Site Location

The Bay Terrace Phase II Development is comprised of two parcels identified by Pierce County records as parcel numbers 2025150011 (western parcel) and 2025140081 (eastern parcel). These properties are located south of the intersection of South 25th Street and Court G between Yakima Avenue and South G Street in Tacoma, Washington. The first phase of the Tacoma Housing Authority’s Bay Terrace Development adjoins the subject to the west and southwest. A general location map is provided as Figure 1 in Appendix A. The Bay Terrace Phase II Development consists of approximately 1.68 acres.

1.3 Site History/Use

The land use of the subject currently is vacant and unoccupied. The property is slated to be developed with multi-family low-income housing, but the area of the excavation is to be developed as a planter area. The site was previously developed as multi-family residential until demolition of the structures in 2014. The remedial actions completed for this report are related to historical use at the approximate address of 2530 South G Street on the eastern parcel. Historical research indicates the subject parcels were predominantly residentially used as early as 1888, with the specific address of the excavation at 2530 South G Street being residential since 1891.

1.4 Previous Reports

We performed a Phase I ESA of the subject site and surrounding Bay Terrace properties in 2009 (Robinson, Noble & Saltbush, Inc., 2009). Arsenic and lead contamination was identified in the topsoil, and subsequently remediated. Confirmation samples showed arsenic and lead levels in the remaining soil were below applicable cleanup levels (Robinson Noble, Inc., 2013).

During the first phase of the Bay Terrace Development, a gasoline soil plume was discovered during an excavation for a storm water vault on the adjoining property just west of the subject

(Robinson Noble, Inc., 2014). We supervised the excavation of 149 tons of petroleum-contaminated soil (PCS) and performed confirmation sampling. A subsequent groundwater monitoring well was drilled. Confirmational soil and groundwater samples were identified below the MTCA Method A cleanup levels, and the site achieved a “no-further-action” (NFA) status from Ecology.

During a geotechnical investigation of the Bay Terrace Phase II Development (GeoEngineers, 2015), petroleum contamination was discovered in soil at one borehole (B6). A copy of the borehole log is attached in Appendix C. The petroleum hydrocarbon contamination was reported ranging in depth from 7.5 to 16 feet below ground surface.

In 2015, we performed a Phase I ESA of the Bay Terrace Phase II Development. Based on the findings of the geotechnical investigation, we recommended excavation and removal of the soil contamination surrounding the borehole B6. We recommended the independent cleanup action be completed followed by a formal cleanup review from Ecology.

1.4 Regional Geology

The Bay Terrace Phase II Development is at an elevation of approximately 260 feet above sea level. The area of this investigation is slightly lower, at 250 feet above sea level, in a relatively flat area of the eastern parcel.

Troost (in review) maps the surface geology of the subject and surrounding area as Quaternary Vashon till (Qvt), Quaternary Vashon advance outwash (Qva), and Quaternary Steilacoom gravel (Qvs). The Qvt generally has low permeability as it is composed of a compacted mix of sand, silt, clay, and gravels. The Qva and Qvs deposits generally have higher permeability and are composed of sand and gravel deposits. Troost also maps Quaternary Vashon ice contact (Qvi) deposits just east of the subject. The ice-contact deposits are a mix of fine to coarse-grained sediments that have a moderate permeability.

On-site and adjoining off-site subsurface explorations previously completed confirm the subsurface geology is primarily a mix of fill, sand and gravel, ice-contact, and glacial till sediments. Based upon well and borehole logs completed on the subject and the adjoining property, the depth to groundwater is generally 17.5 to 28 feet below ground surface. Shallow groundwater flow directions and depths are likely influenced by topography and primarily flow easterly.

2.0 Laboratory Analysis

All laboratory analysis for this project was completed by Libby Environmental (Libby). Libby utilized Ecology Test Methods NWTPH-Gx, NWTPH-Dx/Dx Extended, and EPA Test Method 8260. Ecology Test Method NWTPH-Gx is the qualitative and quantitative method (extended) for volatile (“gasoline”) petroleum products in soil and water. Petroleum products applicable for this method include aviation and automotive gasoline, mineral spirits, Stoddard solvent, and naphtha.

Ecology Test Method NWTPH-Dx/Dx Extended is the qualitative and quantitative method (extended) for semi-volatile (“diesel”) petroleum products in soil and water. Petroleum products applicable for this include jet fuels, kerosene, diesel oils, hydraulic fluids, mineral oils, lubricating oils, and fuel oils. NWTPH-Dx adapts Oregon’s TPH, Washington’s WTPH, and EPA SW-846 Methods 3510, 3540/3550, and 8000 and covers the quantitative and qualitative analysis of semi-volatile petroleum products (i.e., jet fuels through heavy fuel oils in soil and water).

EPA Test Method 8260C is used to analyze volatile organic compounds by using gas chromatography/mass spectrometry. Identification of target analytes is accomplished by comparing mass

spectra with the electron impact (or electron impact-like) spectra of authentic standards. Quantitation is accomplished by comparing the response of a major ion relative to an internal standard using a five-point calibration curve.

3.0 Soil Remediation

On February 18 and 19, Robinson Noble observed the excavation of the petroleum-contaminated soils (PCS) identified in the GeoEngineers B6 borehole located on the southern portion of the Bay Terrace Phase II Development. Absher Construction Company's (Absher's) sub-contractor, Northwest Cascade, Inc. (NWC), dug the excavation (details on Figure 2). Libby Environmental (Libby) performed laboratory analysis of the soil samples for the project using a mobile laboratory. Samples for this project were run for gasoline, benzene (B), toluene (T), ethylbenzene (E), total xylenes (X), naphthalene, 1,2-dichloroethane (EDC), 1,2-dibromoethane (EDB), methyl tert-butyl ether (MTBE), diesel, and oil-range hydrocarbons. After the initial analysis, it was determined that the primary contaminant of concern for the property was solely diesel-range hydrocarbons as no detections of gasoline, BTEX, EDB, EDC, MTBE, or oil-range petroleum hydrocarbons were found in the four initial analyzed samples (SP1, SP2, SP3, and PB17) from the excavation. These results are attached in Appendix B.

Six feet of clean overburden were removed from the site and stockpiled. Additionally, benches in the clean soils surrounding the plume were excavated, and the soils stockpiled. We collected three samples from the clean overburden stockpile (OBSP1, OBSP2, and OBSP3). Analysis of all three samples for diesel-range hydrocarbons reported no detections, confirming the overburden was clean.

3.1 Excavation and Stockpiling of Contaminated soil

Soil vapor and petroleum staining were encountered from approximately 6 feet below ground down to 16 feet below ground immediately below the location of B6. Further south, vapors and staining were encountered at shallower depths from approximately 4 feet below ground down to 11 feet below ground. Contaminated soils were stockpiled on site in a contained area using hay bales and Visqueen plastic sheeting. Overnight, the contaminated stockpile was covered with Visqueen to prevent wetting. Samples were collected as the excavated soil was placed in the contained area. We collected six contaminated stockpile samples (SP1, SP2, SP3, SP4, SP5, and SP6). Table 1, below, summarizes the analytical results from the stockpile samples.

Table 1. Stockpile sample results summary

Sample ID	Diesel results (mg/kg)
SP1	<50
SP2	126
SP3	1,190
SP4	632
SP5	3,420
SP6	1,700
MTCA Method A cleanup level	2,000

As shown in Table 1, the diesel concentrations in the contaminated stockpile samples ranged from non-detect up to 3,420 mg/kg. Three of the stockpile samples (SP1, SP2, and SP3) were run for gasoline, BTEX, EDB, EDC, MTBE, and naphthalene. No detections of gasoline or the gasoline-range volatiles were identified in the samples.

3.2 Confirmation Sampling

Following excavation of the visually-impacted and vapor-impacted soils, we collected confirmation samples from the pit bottom and sidewalls of the excavation to ensure all impacted soil had been removed. Three samples were collected from the pit bottom (PB-17', PB2-9', and PB3-11'), and one sample each was collected from the four sidewalls (WW-9', EW-9', NW-10', and SW-10'). Table 2, displays the results of the confirmation samples. Figure 2, attached, shows the location of the samples collected.

Table 2. Confirmation sample results summary

Sample ID	Diesel results (mg/kg)	Description
PB-17'	<50	At B6, bottom of pit
PB2-9'	<50	3' south of B6 on pit bottom
PB3-11'	<50	5' south of PB2 on pit bottom
WW-9'	<50	West wall center, 9' below ground
EW-9'	<50	East wall center, 9' below ground
NW-10'	<50	North wall center, 10' below ground
SW-10'	<50	South wall center, 10' below ground
MTCA Method A cleanup level	2,000	

The results in Table 2 show no detections of diesel-range petroleum hydrocarbons in the seven confirmation samples collected. Additionally, PB-17' was run for gasoline, BTEX, EDB, EDC, MTBE, and naphthalene. No detections of gasoline or the gasoline-range volatiles were identified in the sample. These results confirm remediation of the soil was achieved as all remaining soil samples were reported below the MTCA Method A cleanup levels for unrestricted land use criteria.

3.3 Backfill and PCS Disposal

Following confirmation of the clean sidewalls and pit bottom, the hole was backfilled with the clean overburden stockpile alternated with pit-run sand and gravel from the Miles Sand & Gravel Fennel Pit. The backfilling was completed in shallow lifts, and the soils were compacted with vibratory plate compactor. Robinson Noble personnel were on site to confirm compaction testing of the materials. The backfill and compaction activities are summarized in the geotechnical field report (Attached in Appendix C).

On February 19, we obtained the waste disposal authorization (WDA) from the Tacoma-Pierce County Health Department and provided copies to Absher and NWC. The compaction was completed on February 22, and on the same day, NWC began hauling the contaminated stockpiles to the LRI landfill (LRI). According to LRI representatives, a total of 86.99 tons of petroleum-contaminated soils were disposed of at the landfill. As of the date of this report, Absher and NWC have not supplied us with the bill of lading tickets for the hauling.

4.0 Groundwater Investigation

On March 3, we performed the follow up groundwater characterization in the area of the excavation pit. Holt Services (Holt) mobilized to the site to drill a single monitoring well through the backfill and into shallow groundwater. Figure 3, attached in Appendix A, shows the location of the monitoring well.

The monitoring well, BT2, was drilled to a total depth of 35 feet below ground surface using hollow-stem auger methods. Drilling encountered 17 feet of fill followed by 13 feet of silty sand with gravel and 5 feet of silty sand. Groundwater was encountered at a depth of approximately 22 feet below ground surface. The well was constructed with 15 feet of 2-inch diameter PVC well screen and approximately 20 feet of 2-inch diameter blank PVC riser. Colorado silica sand pack was placed around the screened interval. Figure 4, attached in Appendix A, shows the geology and construction details of the well.

On March 7, we developed the well using surge-and-bail techniques. A two-inch surge block was run repeatedly through the screened interval, then a new polyethylene bailer was deployed to retrieve development water. A total of approximately 18 gallons of silty water were developed from the well.

4.1 Groundwater Sampling

On March 11, Robinson Noble purged and sampled the well using a low-flow bladder pump and new polyethylene tubing. Prior to sampling, a static water level of 16.16 feet below the top of the casing (16.33 feet below ground) was measured in the well. During purging, groundwater quality stabilization parameters of temperature, pH, conductivity, dissolved oxygen, oxidation-reduction potential (ORP), turbidity, and total dissolved solids were monitored. After 28 minutes of purging, the water quality parameters stabilized and two ½-liter amber containers were filled.

The samples were delivered to Libby Environmental on the same day for analysis of diesel-range petroleum hydrocarbons using NWTPH-Dx/Dx Extended methods. On March 14, Libby performed analysis of the samples. No detections of diesel- or oil-range petroleum hydrocarbons were found in the samples (<200 ug/L for diesel; <400 ug/L for oil), which are below the MTCA Method A cleanup levels. The laboratory results are attached in Appendix B. These results indicate groundwater below the excavation was not historically impacted by the contamination in the soil.

5.0 Discussion / Findings

A total of 86.99 tons of diesel-contaminated soil were excavated and disposed off site at the LRI Landfill. The contamination ranged from 4 to 17 feet below ground surface. Confirmation sampling showed no residual soil impacts from diesel-range hydrocarbons remaining at the site following the excavation. Samples from all pit bottom and side wall were reported without detections of target contaminants, which is below the MTCA Method A cleanup level of 2,000 mg/kg for diesel. Four samples were also submitted for analysis of gasoline-range hydrocarbons and gasoline-range VOC's. No gasoline or gasoline-range VOC's were found, and the results are below the respective MTCA Method A cleanup levels for those contaminants.

Following backfilling of the pit, a groundwater monitoring well was drilled to below the water table through the center of the former excavation. The well was developed using surge-and-bail techniques. On the following day, groundwater samples were collected using low flow techniques. Analysis of the groundwater samples did not detect diesel, which is below the MTCA Method A cleanup level of 500 ug/L for diesel in groundwater.

Based on the results of the soil excavation and subsequent groundwater characterization, the site has successfully been remediated to below applicable cleanup levels. It appears a no-further-action (NFA) determination from Ecology is appropriate. No evidence of remaining soil or groundwater contamination was identified following the remedial actions.

The historical use of the property has been primarily residential. The address likely associated with the former diesel plume is 2530 South G Street in Tacoma. The Tacoma Public Library's Tacoma-Pierce County building index indicates the residence at 2530 South G Street was built in 1891. City of Tacoma Land Use Permit History Records indicate the residence was demolished in 1971.

The laboratory analysis of the petroleum hydrocarbons revealed the sole contaminant of concern was diesel-range petroleum hydrocarbons. The historical site use and contaminant of concern being diesel indicate the likely source of the contamination is historical use of heating oil at the property. No heating oil underground storage tanks (UST's) were found during the excavation. Based on the field results, if a historical heating oil UST was previously used, it had either previously removed from the site or was an above-ground tank. The entire plume area was successfully remediated and no tanks were identified in the excavated area.

6.0 Quality Assurance/Quality Control (QA/QC)

6.1 Daily Field QA/QC

The project manager reviewed all documentation including sample logs, custody forms and field logs prior to samples being delivered to the laboratory. Review was done for completeness, accuracy, and consistency. No discrepancies were encountered.

6.2 Sample Packaging and Shipping

The soil and groundwater samples collected for chemical analysis were kept out of direct sunlight and were checked for label completeness and cap tightness. Soil samples were submitted directly to the on-site laboratory within five minutes of collection. Groundwater samples submitted to the off-site laboratory were thermally preserved in the field (4 degrees Celsius) immediately after sample collection by placing the samples upright in a pre-cooled insulated ice chest containing uncontaminated BlueIcel®. The cooler was constructed without a drain of plastic or fiberglass standard to those provided by environmental analytic laboratories.

6.3 Chain-of-Custody

A chain-of-custody form accompanied samples submitted to the laboratory. Chain-of-custody forms were in order as noted in the analytical narrative from the contractor laboratory.

6.4 Laboratory QA/QC

A narrative regarding quality assurance and quality control is provided with the laboratory analysis reports. There were no reported QA/QC deviations in the analysis performed.

7.0 Conclusions and Recommendations

The activities outlined in this report describe the successful remediation of 86.99 tons of diesel-impacted soil on the Bay Terrace Phase II Development. Confirmation samples from the excavation show remaining levels of diesel in soil are below method detection limits and below the MTCA Method A cleanup levels for unrestricted land use criteria. Additionally, follow up groundwater characterization immediately below the former soil contamination showed levels of diesel below method detection limits and MTCA Method A cleanup levels. Based on the findings in this report, it appears no further remedial actions are necessary.

7.1 Recommendations

We recommend entry into Ecology's Voluntary Cleanup Program (VCP) to allow for formal review of the cleanup actions delineated in this report. We recommend seeking an opinion from Ecology through the VCP to determine if NFA determination is appropriate. Based on our findings discussed in this report, it appears NFA is likely and the site will achieve closure status regarding the remediated diesel contamination.

8.0 Limitations

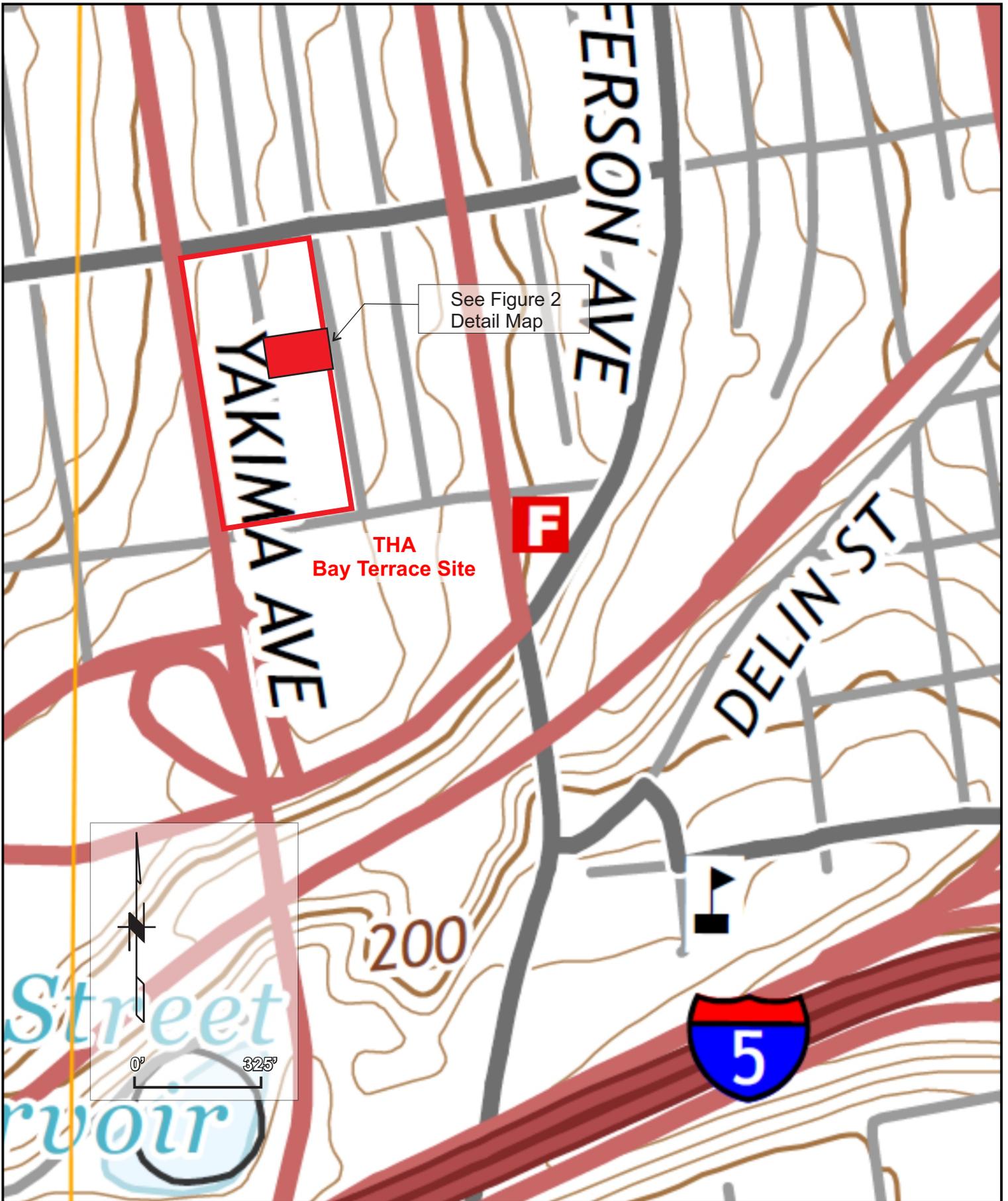
The statements, conclusions, and recommendations provided in this report are to be exclusively used within the context of this document. They are based upon generally accepted hydrogeologic and environmental practices and are the result of analysis by Robinson Noble, Inc. staff. This report, and any attachments to it, is for the exclusive use of Tacoma Housing Authority. Unless specifically stated in the document, no warranty, expressed or implied, is made. This concludes the investigation and presentation of material gathered on the herein-described site for the tasks described for this study.

9.0 References

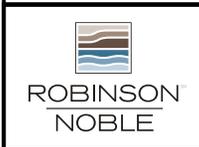
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- Washington State Department of Ecology, Toxics Cleanup Program, Guidance on sampling and data analysis methods, Publication No. 94-49

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APPENDIX A



 ROBINSON NOBLE	Note: Basemap taken from USGS Tacoma South 2014 Quadrangle	PM: MPB April 2016 2183-007G	Pierce County T 20 N/R 03 E - 08 Scale 1" = 325'	Figure 1 Overview Map of Site Tacoma Housing Authority: Bay Terrace Ph. 2 Excavation
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Note: Basemap modified from Larson & Associates professional land survey for THA

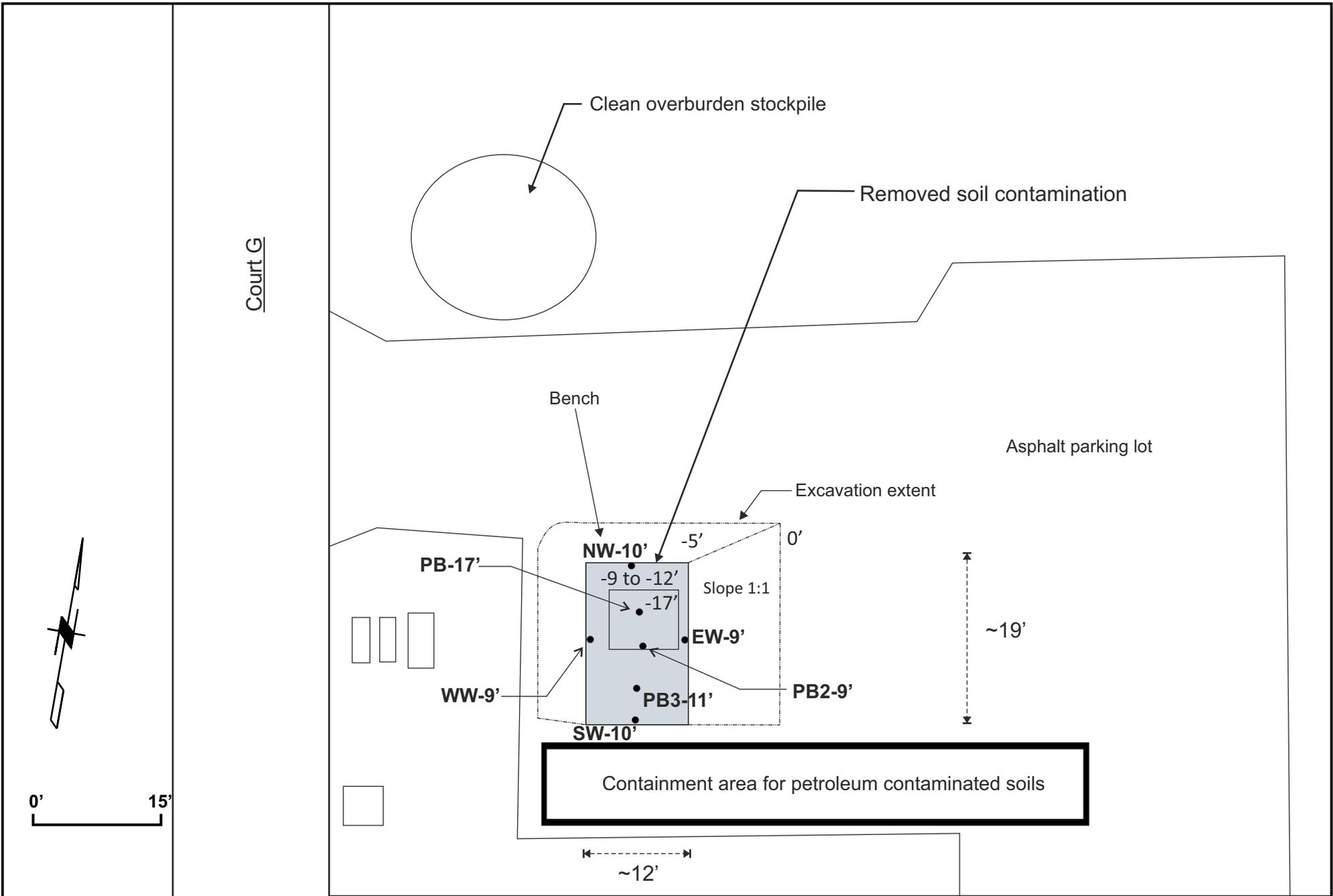
PM: MPB
April 2016
2183-007G

Pierce County
T 20 N/R 03 E - 08
Scale 1" = 15'

Figure 3

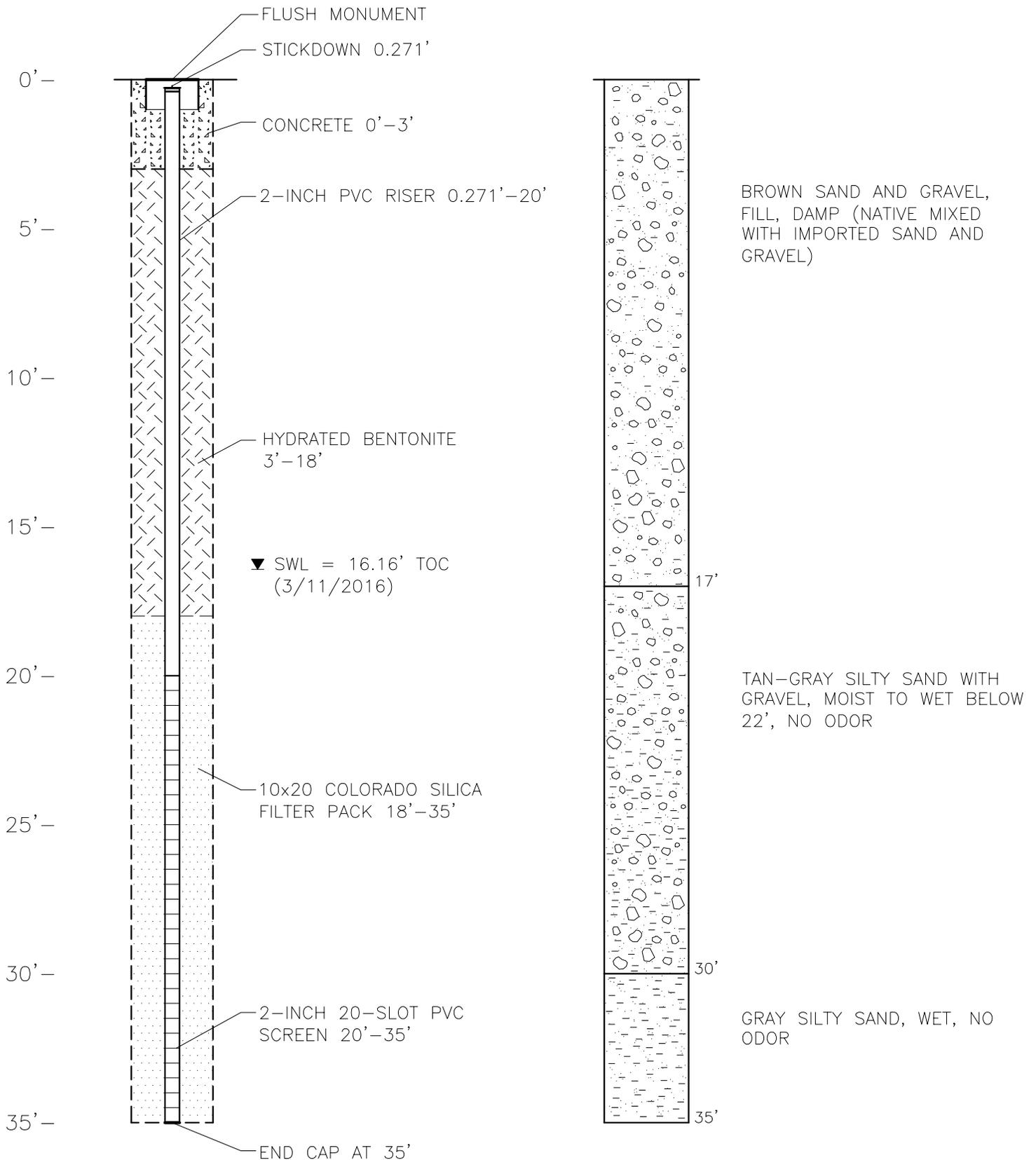
Monitoring Well Location Map

Tacoma Housing Authority: Bay Terrace Ph. 2 Excavation



Construction Detail

Geologic Log



APPENDIX B



Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

February 19, 2016

John Hildenbrand
Robinson Noble
2105 South C Street
Tacoma, WA 98402

Dear Mr. Hildenbrand:

Please find enclosed the analytical data report for the THA Bay Terrace Project located in Tacoma, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

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THA BAY TERRACE PROJECT
 Robinson Noble
 Tacoma, Washington
 Libby Project # L160218-40
 Client Project # 2183-007G

Specific Halogenated and Aromatic Hydrocarbons by EPA 8260C in Soil

Sample Description		Method Blank	SP1	SP1 Dup	SP2	SP3	PB17
Date Sampled		N/A	2/18/16	2/18/16	2/18/16	2/18/16	2/18/16
Date Analyzed	PQL	2/18/16	2/18/16	2/18/16	2/18/16	2/18/16	2/18/16
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Benzene	0.02	nd	nd	nd	nd	<0.2	nd
Toluene	0.10	nd	nd	nd	nd	<1.0	nd
Ethylbenzene	0.05	nd	nd	nd	nd	<0.5	nd
Total Xylenes	0.15	nd	nd	nd	nd	<1.5	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd	nd	nd	<0.3	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd	nd	nd	<0.05	nd
Total Naphthalenes	0.05	nd	nd	nd	nd	<0.5	nd
Methyl <i>tert</i> - Butyl Ether (MTBE)	0.05	nd	nd	nd	nd	<0.5	nd
Surrogate Recovery							
Dibromofluoromethane		92	95	88	89	88	86
1,2-Dichloroethane-d4		85	86	88	85	77	86
Toluene-d8		91	90	93	91	81	90
4-Bromofluorobenzene		86	92	93	89	104	88
"nd" Indicates not detected at listed detection limit.							
"int" Indicates that interference prevents determination.							

* ANALYZED BY SIM

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

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THA BAY TERRACE PROJECT
Robinson Noble
Tacoma, Washington
Libby Project # L160218-40
Client Project # 2183-007G

QA/QC Data - EPA 8260C Analyses

Sample Identification: PB17							
	Matrix Spike		Matrix Spike Duplicate			RPD	
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	
Benzene	0.5	0.57	114	0.5	0.54	108	5.4
Toluene	0.5	0.44	88	0.5	0.43	86	2.3
Surrogate Recovery							
Dibromofluoromethane			82			88	
1,2-Dichloroethane-d4			76			82	
Toluene-d8			76			78	
4-Bromofluorobenzene			80			81	

Laboratory Control Sample			
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
Benzene	0.5	0.48	96
Toluene	0.5	0.43	86

Surrogate Recovery			
Dibromofluoromethane			94
1,2-Dichloroethane-d4			85
Toluene-d8			92
4-Bromofluorobenzene			87

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Paul Burke

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THA BAY TERRACE PROJECT

Robinson Noble

Tacoma, Washington

Libby Project # L160218-40

Client Project # 2183-007G

Analyses of Gasoline (NWTPH-Gx) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)
Method Blank	2/18/16	91	nd
SP1	2/18/16	90	nd
SP1 Dup	2/18/16	93	nd
SP2	2/18/16	91	nd
SP3	2/18/16	81	<100
PB17	2/18/16	90	nd
Practical Quantitation Limit			10

"nd" Indicates not detected at the listed detection limits.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Toluene-d8): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

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THA BAY TERRACE PROJECT

Robinson Noble

Tacoma, Washington

Libby Project # L160218-40

Client Project # 2183-007G

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (mg/kg)	Oil (mg/kg)
Method Blank	2/18/16	101	nd	nd
SP1	2/18/16	107	nd	nd
SP1 Dup	2/18/16	111	nd	nd
SP2	2/18/16	int	126	nd
SP3	2/18/16	int	1190	nd
PB17	2/18/16	107	nd	nd
SP4	2/18/16	int	632	nd
SP5	2/18/16	int	3420	nd
SP5 Dup	2/18/16	int	3380	nd
PB2-9	2/18/16	104	nd	nd
WW9	2/18/16	113	nd	nd
EW9	2/18/16	100	nd	nd
NW10	2/18/16	100	nd	nd
SP6	2/18/16	int	1700	nd
Practical Quantitation Limit			50	250

"nd" Indicates not detected at the listed detection limits.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 2/18/2016 Page: 1 of 1

Client: RN

Project Manager: JFH

Address: 2105 S C ST

Project Name: TWA RWY TARMAC

City: TACOMA State: WA Zip:

Location: 25TH & COURT G

City, State: TACOMA

Phone: 253 475-7711 Fax:

Collector: MPB

Date of Collection: 2/18

Client Project # 2183-0076

Email: mbradley@robison-noble.com



Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	NWTPH-GX	BTEX 8021	NWTPH-HCID	NWTPH-DX	NWTPH-DXIDX	PAH 8270	Semi Vol 8270	PCB 8082	MTCX 5 Metals	RCRA 8 Metals	Field Notes
1		1030	S	VOL/4oz	X											
2		1040	S	VOL/4oz	X											
3		1130	S	2VOL/4oz	X											
4		1215	S	2VOL/4oz	X											Stream down
5		1230	S	4oz												
6		1330	S	4oz												
7		1350	S	4oz												
8		1355	S	4oz												
9		1400	S	4oz												
10		1405	S	4oz												
11		1430	S	4oz												
12																
13																
14																
15																
16																
17																

Relinquished by: [Signature] Date / Time: 2/18 1525 Received by: [Signature] Date / Time: 2/18/16 1525

Relinquished by: [Signature] Date / Time: 2/18 1525 Received by: [Signature] Date / Time: 2/18/16 1525

Relinquished by: [Signature] Date / Time: 2/18 1525 Received by: [Signature] Date / Time: 2/18/16 1525

Relinquished by: [Signature] Date / Time: 2/18 1525 Received by: [Signature] Date / Time: 2/18/16 1525

Relinquished by: [Signature] Date / Time: 2/18 1525 Received by: [Signature] Date / Time: 2/18/16 1525

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Remarks: Hold Leads until Mike confirms.
TAT: 24HR 48HR 5-DAY
Distribution: White - Lab, Yellow - File, Pink - Originator



Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

February 19, 2016

John Hildenbrand
Robinson Noble
2105 South C Street
Tacoma, WA 98402

Dear Mr. Hildenbrand:

Please find enclosed the analytical data report for the THA Bay Terrace Project located in Tacoma, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

www.LibbyEnvironmental.com

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

THA BAY TERRACE PROJECT
Robinson Noble
Tacoma, Washington
Libby Project # L160219-40
Client Project # 2183-007G

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (mg/kg)	Oil (mg/kg)
Method Blank	2/19/16	100	nd	nd
PB3-11	2/19/16	98	nd	nd
SW-10	2/19/16	100	nd	nd
OBSP1	2/19/16	98	nd	nd
OBSP2	2/19/16	98	nd	nd
OBSP3	2/19/16	95	nd	nd
OBSP3 Dup	2/19/16	97	nd	nd
Practical Quantitation Limit			50	250

"nd" Indicates not detected at the listed detection limits.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Kodey Eley



Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

March 15, 2016

Mike Brady
Robinson Noble
2105 South C Street
Tacoma, WA 98402

Dear Mr. Brady:

Please find enclosed the analytical data report for the Bay Terrace Project located in Tacoma, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

www.LibbyEnvironmental.com

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

BAY TERRACE PROJECT
Robinson Noble
Tacoma, Washington
Libby Project # L160311-1
Client Project # 1038-007G

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel ($\mu\text{g/l}$)	Oil ($\mu\text{g/l}$)
Method Blank	3/14/16	106	nd	nd
BT-2	3/14/16	97	nd	nd
BT-2 Dup	3/14/16	105	nd	nd
Practical Quantitation Limit			200	400

"nd" Indicates not detected at the listed detection limits.

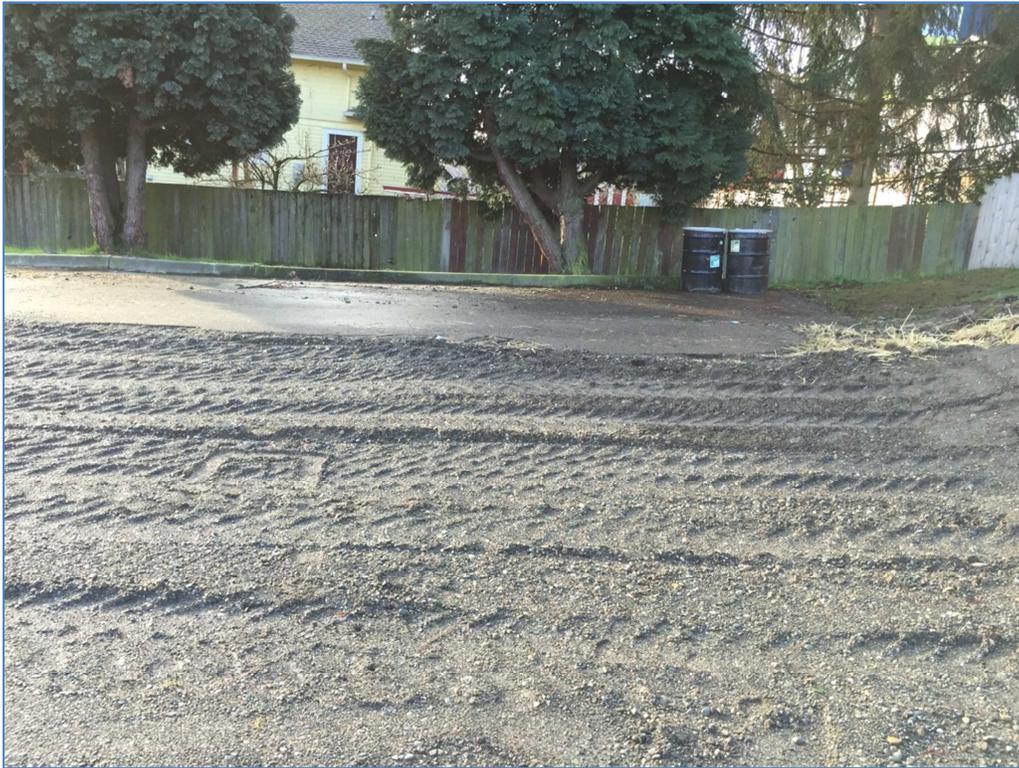
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Maria Friedrich

APPENDIX C

Site photographs for Tacoma Housing Authority
Bay Terrace Groundwater Characterization
March 2016



The area of the excavation backfilled prior to the start of drilling



The drilling rig towering up into position over the well site



Drilling of the well



The final depth of 35 feet achieved.



The completed wellhead of BT-2

Site photographs for Tacoma Housing Authority
Bay Terrace PCS Excavation
March 2016



View of the site prior to the start of excavation



Gray-stained petroleum contamination encountered below the site



Pit bottom at 17 feet below ground



Gray-stained soils on the south wall



Excavation of the south wall



Clean south wall of the excavation



The pit fenced off overnight



Backfilling and compaction of the pit



No. 1984

Tacoma - Pierce County
Health Department
Healthy People in Healthy Communities
www.tpchd.org

WASTE DISPOSAL AUTHORIZATION

Tacoma Pierce County
Health Department

(**XX**) Non-Asbestos (**XX**) New
() Asbestos (PSCAA Case # _____) () Renewal

2/19/2016 11:36:23 AM
Clerk 52-T4
Waste Disposal Auth Initial
\$156.00
Receipt #409561

- A. Generator Name: Tacoma Housing Authority
- B. Generator Address: Old Hillside Terrace Apartment Complex, Tacoma, wa
- C. Transporter Name: NW Cascade/Absher
- D. Technical Contact: Mike Brady, Robinson Noble Phone: 253-475-7711
- E. Waste Description: petroleum contaminated soils (Diesel)
() Sludge (**XX**) Solid (**XX**) PCS () Other
- F. Authorized Quantity: 750 Tons (500 cubic yards)
- G. Actual Quantity (Filled in upon disposal): _____
- H. Multiple Loads: (**XX**) Yes () No
- I. Dates of Disposal: February 19, 2016 through December 30, 2016
- J. Testing: NWTPH - Dx
- K. Reviewed by Department of Ecology: () Yes (**XX**) No
- L. Disposal/Transportation Requirements: **A copy of this WDA must be transported with EACH load of waste and presented to the LRI Landfill Scalehouse Operator. Soils demonstrating excessive odors are not suitable for use as daily cover and shall be directly buried (disposed of) in the landfill. If odors are not excessive and the soils physical characteristics are suitable for utilization as a daily cover then the soils may be used as alternative daily cover. Loads shall be covered during transport to the landfill to prevent fugitive emissions of contaminated soils. Load sizes shall comply with conditional-use and solid waste permit criteria.**
- M. Facility: (**XX**) LRI Landfill (304th Street LF), 30919 Meridian Street, Eatonville, WA

CERTIFICATION

I hereby certify that I have personally examined and am familiar with the information submitted in this document and any supporting material. Based on my inquiry of those individuals immediately responsible for obtaining the information, the information submitted is true, accurate and complete to the best of my knowledge and ability and that all known and suspected hazards have been disclosed. I agree that the generator and/or transporter will abide by all conditions specified in line (L) or any attachments thereto.

2/19/2016
Date

Geologist
Title

Mike Brady

Signature

APPROVED

AUTHORIZED BY:

FEB 19 2016

Dan Watts

Dan Watts, TPCHD

253-798-6574

**TACOMA-PIERCE COUNTY HEALTH DEPT.
ENVIRONMENTAL HEALTH DIV.**

Cc: LRI LF Scalehouse via Fax - 253 875 7205

For Official Use Only

Michael P. Brady

From: Rebecca Gunter <RebeccaG@WasteConnections.com>
Sent: Thursday, February 25, 2016 5:15 PM
To: Michael P. Brady
Subject: RE: WDA Application - Tacoma Housing Authority Bay Terrace

So far 86.99 tons have been hauled.

Rebecca

From: Michael P. Brady [mailto:MBrady@robinson-noble.com]
Sent: Thursday, February 25, 2016 4:00 PM
To: Rebecca Gunter
Subject: RE: WDA Application - Tacoma Housing Authority Bay Terrace

Rebecca,

Do you have a total amount of soil disposed for the Bay Terrace job?

Just the total from your in/out summary sheet would be great.
Thank you again,
Mike

Michael P. Brady LG | Senior Project Geologist

Robinson Noble, Inc. | Hydrogeologists. Geotechnical Engineers. Environmental Scientists.
2105 South C Street Tacoma, WA 98402 | 253.475.7711
www.robinson-noble.com

From: Michael P. Brady
Sent: Thursday, February 25, 2016 9:36 AM
To: 'Joe Turner'; 'ChrisQuesenbury@nwcascade.com'
Cc: 'david.becker@absherco.com'; Natasha R. Garland-Clark
Subject: RE: WDA Application - Tacoma Housing Authority Bay Terrace

Joe,

Do you have copies of the waste disposal tickets for Bay Terrace?
How much was our total?

THA is waiting on a simple letter for the financing, but we need the numbers for the letter.
Thank you again,
Mike

Michael P. Brady LG | Senior Project Geologist

Robinson Noble, Inc. | Hydrogeologists. Geotechnical Engineers. Environmental Scientists.
2105 South C Street Tacoma, WA 98402 | 253.475.7711
www.robinson-noble.com

From: Michael P. Brady
Sent: Friday, February 19, 2016 11:55 AM
To: Joe Turner; 'ChrisQuesenbury@nwcascade.com'
Cc: John F. Hildenbrand; gburden@tacomahousing.org; 'david.becker@absherco.com'; Rebecca Gunter (RebeccaG@WasteConnections.com)
Subject: RE: WDA Application - Tacoma Housing Authority Bay Terrace

All,
Attached is the WDA from the TPCHD for the Bay Terrace Excavation.

I have copied Rebecca Gunter from LRI into the chain so they have a copy.

Thank you,
Mike

Michael P. Brady LG | Senior Project Geologist

Robinson Noble, Inc. | Hydrogeologists. Geotechnical Engineers. Environmental Scientists.
2105 South C Street Tacoma, WA 98402 | 253.475.7711
www.robinson-noble.com

From: Dan Watts [<mailto:DWatts@tpchd.org>]
Sent: Friday, February 19, 2016 10:57 AM
To: Michael P. Brady; Keith Johnston
Cc: John F. Hildenbrand; Joe Turner
Subject: RE: WDA Application - Tacoma Housing Authority Bay Terrace

Hi Michael,

The Tacoma Housing Authority WDA is ready for pick up at our front counter. I also left you a voice message. The fee for the WDA is \$156.00. Please let me know if you have any questions.

Dan Watts

Environmental Health Specialist
Waste Management
(253) 798-3512 o • dwatts@tpchd.org
(253) 798-6498 f • www.tpchd.org



From: Michael P. Brady [<mailto:MBrady@robinson-noble.com>]
Sent: Thursday, February 18, 2016 10:26 PM
To: Keith Johnston
Cc: Dan Watts; John F. Hildenbrand; Joe Turner
Subject: WDA Application - Tacoma Housing Authority Bay Terrace

Keith,

Attached is the WDA application for the Tacoma Housing Authority Bay Terrace PCS plume and attached analytical from the mobile lab.

Contaminant of concern is diesel-range hydrocarbons in a residential setting with the likely source being historical heating oil.

We have built a stockpile on-site that they want to haul as soon as possible. Any expediency would be greatly appreciated.

Please let me know if you have any questions.

Thank you again,

Mike

Michael P. Brady LG | Senior Project Geologist

Robinson Noble, Inc. | Hydrogeologists. Geotechnical Engineers. Environmental Scientists.

2105 South C Street Tacoma, WA 98402 | 253.475.7711

www.robinson-noble.com

FIELD REPORT



**ROBINSON
NOBLE**

17625 130th Avenue NE, Suite 102
Woodinville, Washington 98072
Phone: 425-488-0599
Fax: 425-488-2330
www.robison-noble.com

Project:	Bay Terrace	File No.:	2183-007G
Owner:	Tacoma Housing Authority	Date:	2016-2-19
Location:	South G street	Report #:	1
Weather:	Overcast and raining, 50's	Page:	1 of 3
Purpose of Visit:	Compaction testing	By:	NRGC

We arrived on site at the request of the client for the purpose of evaluating the backfill of a contaminated soil excavation. We arrived on site at approximately 1:00 pm and met with Joe Turner with Absher Construction Company.

EARTHWORK

The contractor, prior to our arrival, had excavated down to a depth of about 17 feet in the approximate location of the contaminated soil on the south side of the site. We observed a five foot bench cut in the surrounding native soil along northern and western sides and an approximate 1H:1V slope for access to the trench. The excavation had been backfilled and compacted to about nine feet below grade. The backfill consisted of native brown sandy fine silt with gravel and organics.

While on site we collected a sample of the backfill material for laboratory testing in accordance with ASTM D1557. The contractor informed us that the backfill was placed in two-foot lifts and compacted with a vibratory plate compactor attached to the excavator.

We tested the previously compacted native fill with a Troxler nuclear density gage. We observed the contractor fill the area with the previously excavated material up to about five feet below grade and compacted in two, one to two-foot lifts with a vibratory plate compactor attached to the excavator. We tested the compacted fill with a Troxler nuclear density gage. The test results are presented below. The approximate test locations are shown on the attached site plan. All tests met or exceeded project specifications.

Attachment:

Distribution:

Signed:

FIELD REPORT



**ROBINSON
NOBLE**

17625 130th Avenue NE, Suite 102
Woodinville, Washington 98072
Phone: 425-488-0599
Fax: 425-488-2330
www.robinson-noble.com

Project:	Bay Terrace	File No.:	2183-007G
Owner:	Tacoma Housing Authority	Date:	2016-2-19
Location:	South G street	Report #:	1
Weather:	Overcast and raining, 50's	Page:	2 of 3
Purpose of Visit:	Compaction testing	By:	NRGC

Proctor Method: _____ ASTM D 698 <u>XX</u> _____ ASTM D 1557										
Test #	Approx. Feet to Grade	Approx. Fill Depth (feet)	% Moist.	Dry Density (pcf)	Proctor Test #	Optimum Moist. Cont. %	Max. Density (pcf)	% Comp.	% Spec.	Comments
1	8	8	15.4	116.2	1	11.5	123	94	90	Pass, 17 blows
2	5	11	14.2	117.2	1	11.5	123	95	90	Pass, 25 blows
3	4	12	10.5	119.9	1	9	131*	91	90	Pass, 14 blows
4	4	12	11.2	115.9	1	11.5	123	94	90	Pass, 21 blows
5	4	12	12	124.2	1	9	131*	94	90	Pass, 22 blows
6	4	12	14.9	114.9	1	11.5	123	93	90	Pass, 27 blows
7	4	12	14.5	121.2	1	9	131*	92	90	Pass, 22 blows

*rock correction

Attachment:
Distribution:

Signed:

FIELD REPORT



ROBINSON
NOBLE

17625 130th Avenue NE, Suite 102
Woodinville, Washington 98072

Phone: 425-488-0599
Fax: 425-488-2330

www.robison-noble.com

Project:	Bay Terrace	File No.:	2183-007G
Owner:	Tacoma Housing Authority	Date:	2016-2-22
Location:	South G street	Report #:	2
Weather:	Partly Cloudy, 50's	Page:	1 of 3
Purpose of Visit:	Compaction testing	By:	NRGC

We arrived on site at the request of the client for the purpose of evaluating the backfill of a contaminated soil excavation trench. We arrived on site at approximately 8:30 am and met with Joe Turner with Absher Construction Company.

EARTHWORK

We observed the contractor fill the excavated area with gravel borrow fill in a one foot lift 4 feet from grade with a vibratory plate compactor attached to the excavator. The fill consisted of grey 1 ¼ -inch minus rock. The previously excavated material, consisting of native brown sandy fine silt with gravel and trace organics was then placed on top of, in less than one foot lifts, for a total of two lifts, two feet below grade and was compacted with a vibratory plate compactor. The remaining gravel borrow was used to fill the trench up to grade and was compacted in one, two-foot lift with a vibratory plate compactor. We tested the compacted fill, both the native and gravel borrow fill, with a Troxler nuclear density gage. The test results are presented below. The approximate test locations are shown on the attached site plan. All tests met or exceeded project specifications.

Attachment:

Distribution:

Signed:

FIELD REPORT



**ROBINSON
NOBLE**

17625 130th Avenue NE, Suite 102
Woodinville, Washington 98072
Phone: 425-488-0599
Fax: 425-488-2330
www.robinson-noble.com

Project:	Bay Terrace	File No.:	2183-007G
Owner:	Tacoma Housing Authority	Date:	2016-2-22
Location:	South G street	Report #:	2
Weather:	Partly Cloudy, 50's	Page:	2 of 3
Purpose of Visit:	Compaction testing	By:	NRGC

Proctor Method: <u> </u> ASTM D 698 <u> XX </u> ASTM D 1557										
Test #	Approx. Feet to Grade	Approx. Fill Depth (feet)	% Moist.	Dry Density (pcf)	Proctor Test #	Optimum Moist. Cont. %	Max. Density (pcf)	% Comp.	% Spec.	Comments
8	4	12	8.3	129.4	1	7.9*	133.7*	96	90	Pass, 28 blows
9	4	12	7.2	133.2	1	7.9*	133.7*	99	90	Pass, 39 blows
10	3	13	9.5	123.5	2	9*	123	100	90	Pass, 11 blows
11	3	13	12.1	120.1	2	11.5	123	97	90	Pass, 15 blows
12	3	13	10.8	114.8	2	11.5	123	93	90	Pass, 19 blows
13	3	13	9.7	119.1	2	11.5	123	96	90	Pass, 21 blows
14	3	13	8.2	126.6	2	9*	131*	96	90	Pass, 8 blows
15	2	14	9.5	122.7	2	11.5	123	99	90	Pass, 25 blows
16	2	14	9.4	118.8	2	11.5	123	96	90	Pass, 23 blows
17	2	14	9.9	113.8	2	11.5	123	92	90	Pass, 18 blows
18	2	14	10.6	120.6	2	11.5	123	98	90	Pass, 20 blows
19	0	16	8	134	1	7.9*	133.7*	100	90	Pass, 20 blows
20	0	16	7.3	129.7	1	7.9*	132.1*	98	90	Pass, 20 blows
21	0	16	8.3	133.4	1	7.9*	133.7*	100	90	Pass, 25 blows
22	0	16	7.4	133.8	1	7.9*	133.7*	100	90	Pass, 19 blows
23	0	16	7.7	133.1	1	7.9*	133.7*	99	90	Pass, 20 blows
24	0	16	8	134	1	7.9*	133.7*	100	90	Pass, 21 blows
25	0	16	7.8	130.4	1	7.9*	133.7*	97	90	Pass, 28 blows

*rock correction

**Adjusted value

Attachment:

Signed:

Distribution:

Drilled	Start 5/21/2015	End 5/21/2015	Total Depth (ft)	31.25	Logged By Checked By	BK EWH	Driller	Holocene Drilling Inc.	Drilling Method	Hollow-Stem Auger
Surface Elevation (ft) Vertical Datum	250 City of Tacoma NGVD29			Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment	Diedrich D-120		
Easting (X) Northing (Y)	Notes:			System Datum	Groundwater Date Measured		Depth to Water (ft)	Elevation (ft) See Remarks		

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0							AC			Approximately 1 inch asphalt concrete pavement
							SM			Brown silty fine to coarse sand with gravel (medium dense, moist) (fill)
245	1	16		1						Rock in shoe
	18	34		2	%F		SM	9	18	Gray silty fine to coarse sand and occasional gravel (dense to very dense, moist) (glacial ice contact deposits)
240	11	54		3						Noted petroleum odor in sampler Sheen = SS; Vapor = 10.8 ppm
	18	38		4						
235	15	38		5						Strong petroleum odor Sheen = SS; Vapor = 75 ppm
230	20	55		6						Sheen = NS; Vapor = 9.5 ppm
225	25	37		7						Sheen = SS; Vapor = 3.6 ppm
220	30	41		8						Groundwater observed at approximately 28.5 feet below ground surface Sheen = NS; Vapor = 7.4 ppm

Notes: See Figure 3 for explanation of symbols.

Log of Boring B-6



Project: Bay Terrace Redevelopment - Phase II
 Project Location: Tacoma, Washington
 Project Number: 2620-008-05

Figure 9
 Sheet 1 of 1

Tacoma-Pierce County Buildings Index - Image Display (new Building search)

Displaying Record #15460

Address	Built	Demolished	Style	Registry?	Images?
2530 SO. G ST., Tacoma	1890				
Christopher Moore, builder -Reed's Add. TDL 1/1/1891 p .14 permits TDL = Tacoma Daily Ledger					
There are no images in the Buildings Index for this address -- Do you have any?					



DEMOLITION

BUILDING INSPECTION RECORD

ADDRESS 2530 South "G"		OWNER Jack Trunk	ZONE R.4
BUILDING PERMIT		INSPECTION	
DATE 6-1-71	NO. E 37811	BUILDING	FINAL <i>OK-JF</i> 11-15-71
NATURE OF WORK \$200.		PLUMBING	
Demolish s/f dwelling V		ROUGH	
FOUNDATION		FINAL	
CHIMNEYS			HEATING
<i>8-23-71- Down to sub floor-JF</i>		FINAL	
FRAMING <i>Jack gave this to</i>		SEWER OR SEPTIC TANK	
<i>Gordon Taylor-11-1-71</i>			
GARAGES'			
<i>10-21-71-Complete-No Plug Sewer</i> <i>JF</i>			
OWNER		CONTRACTOR	
CONTRACTOR		9-10-61	